# S.Q. TUBE

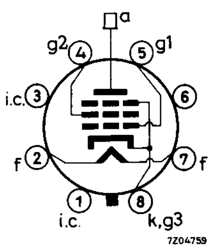
Special quality output pentode designed for use as line output tube, power output tube, wide band amplifier and series regulator tube.

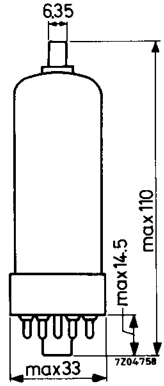
| QUICK REFERENCE DATA | | | |
|---|---|---|---|
| Life test | 10 000 hours | | |
| Low interface resistance | | | |
| Mechanical quality | Shock and vibration resistant | | |
| Base | Octal | | |
| Heating | Indirect<br>A.C. or D.C.; parallel supply | | |
| Heater voltage | $V_f$ | 6.3 | V |
| Heater current | $I_f$ | 1.2 | A |
| Anode current | $I_a$ | 100 | mA |
| Mutual conductance | S | 14 | mA/V |
| Output power. Class B (2 tubes) | $W_o$ | 30 | W |

**DIMENSIONS AND CONNECTIONS**

Dimensions in mm

Base: Octal



## CHARACTERISTICS

Column I Nominal value or setting of the tube
II Range values for equipment design: Initial spread
III Range values for equipment design: End of life

| | | I | II | III | |
|---|---|---|---|---|---|
| Heater voltage | $V_f$ | 6.3 | | | V |
| Heater current | $I_f$ | 1.2 | 1.12 - 1.28 | | A |
| Anode voltage | $V_a$ | 100 | | | V |
| Grid No.2 voltage | $V_{g_2}$ | 100 | | | V |
| Cathode resistor | $R_k$ | 75 | | | Ω |
| Anode current | $I_a$ | 100 | 85 - 118 | min. 65 | mA |
| Grid No.2 current | $I_{g_2}$ | 5.2 | 4.0 - 6.5 | | mA |
| Mutual conductance | S | 14 | 11.5 - 16.5 | min. 9.5 | mA/V |
| Amplification factor | $\mu_{g_2 g_1}$ | 5.6 | | | |
| Internal resistance | $R_i$ | 5.0 | | | kΩ |
| Cut-off voltage | $-V_{g_1}$ | 35 | | | V |
| Anode current | $I_a$ | 0.1 | | | mA |
| Negative grid No.1 current | $-I_{g_1}$ | | max. 1 | max. 2 | μA |
| Cut-off voltage | $-V_{g_1}$ | | max. 120 | | V |
| Anode voltage | $V_a$ | 7 | | | $kV_p$ |
| Grid No. 2 voltage | $V_{g_2}$ | 190 | | | V |
| Cathode current | $I_k$ | 60 | | | μA |
| As triode (grid No.2 connected to anode) | | | | | |
| Anode voltage | $V_a$ | 100 | | | V |
| Cathode resistor | $R_k$ | 85 | | | Ω |
| Anode current | $I_a$ | 100 | | | mA |
| Mutual conductance | S | 14 | | | mA/V |
| Amplification factor | μ | 5.2 | | | |
| Internal resistance | $R_i$ | 350 | | | Ω |

## CHARACTERISTICS (continued)

| | | II | |
|---|---|---|---|
| Insulation resistance between: | | | |
| Anode and other electrodes | $R_{ins}$ | min. 100 | MΩ |
| Grid No. 1 and other electrodes | $R_{ins}$ | min. 100 | MΩ |
| Leakage current between cathode and heater | $I_{kf}$ | max. 20 | μA |

## CAPACITANCES

| | | I | II | |
|---|---|---|---|---|
| Anode to grid No. 2, grid No. 3, cathode and heater | $C_{a/g_2g_3kf}$ | 10 | 9 - 11 | pF |
| Grid No. 1 to grid No. 2, grid No. 3, cathode and heater | $C_{g_1/g_2g_3kf}$ | 19 | 17.5 - 20.5 | pF |
| Anode to grid No. 1 | $C_{ag_1}$ | | max. 1.1 | pF |

## SHOCK AND VIBRATION RESISTANCE

The following test conditions are applied to assess the mechanical quality of the tube. These conditions are not intended to be used as normal operating conditions.

Shock

The tube is subjected 5 times in each 4 positions to an acceleration of 500 g supplied by an NRL shock machine with the hammer lifted over an angle of $30^{o}$.

Vibration

The tube is subjected during 32 hours in each of 3 positions to a vibration frequency of 50 Hz with an acceleration of 2.5 g.

## LIFE

Production samples are tested to be within the end of life values (column III) during 10 000 hours.

**LIMITING VALUES** (Absolute max. rating system)

| | | | | |
|---|---|---|---|---|
| Anode voltage | $V_{a_o}$ | max. | 650 | V |
| | $V_a$ | max. | 400 | V |
| Anode peak voltage | $+V_{a_p}$ | max. | 7 | kV |
| | $-V_{a_p}$ | max. | 1.5 | kV |
| Pulse duration = max. 18 μsec | | | | |
| Duty factor = max. 0.22 | | | | |
| Anode dissipation | $W_a$ | max. | 15 | W |
| Anode + grid No.2 dissipation | $W_{a+g_2}$ | max. | 16 | W |
| Grid No.2 voltage | $V_{g_{2o}}$ | max. | 650 | V |
| | $V_{g_2}$ | max. | 300 | V |
| Grid No.2 dissipation | $W_{g_2}$ | max. | 5.5 | W |
| Grid No.2 dissipation during heating up of EHT diode | $W_{g_2}$ | max. | 7.0 | W |
| Grid No.1 peak voltage | $-V_{g_{1p}}$ | max. | 1 | kV |
| Pulse duration = max. 18 μsec | | | | |
| Duty factor = max. 0.22 | | | | |
| Grid No.1 resistor | $R_{g_1}$ | max. | 0.5 | MΩ |
| Grid No.1 resistor in line output circuits | $R_{g_1}$ | max. | 2.2 | MΩ |
| Cathode current | $I_k$ | max. | 220 | mA |
| Cathode peak current | $I_{k_p}$ | max. | 1.2 | A |
| Averaging time = max. 10 msec | | | | |
| Voltage between cathode and heater | | | | |
| Cathode positive | $V_{kf}$ (k pos) | max. | 250 | V |
| Cathode negative | $V_{kf}$ (k neg) | max. | 200 | V |
| Bulb temperature | $t_{bulb}$ | max. | 220 | °C |

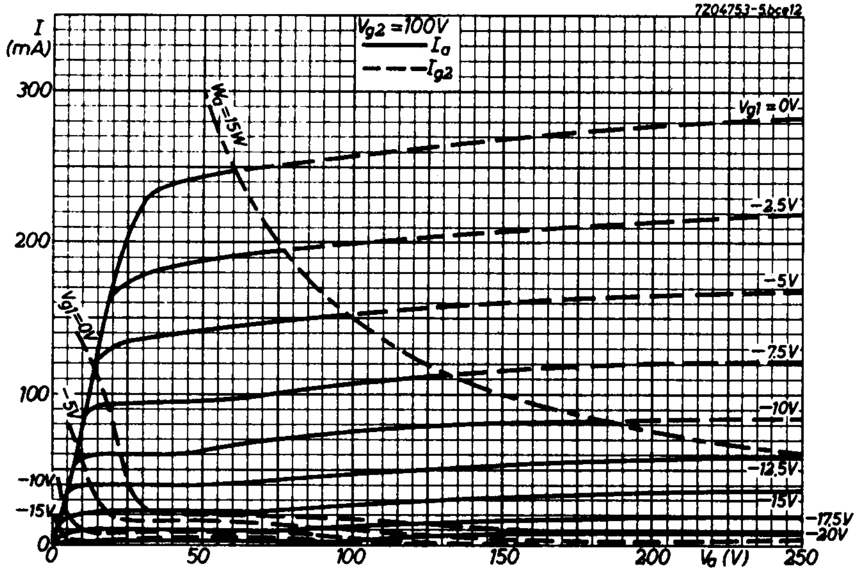
Heater voltage: The average heater value should be 6.3 V.
Variation of the heater voltage exceeding the range of 6.0 V to 6.6 V will shorten the tube life.
The tolerance of heater current should be taken into account.

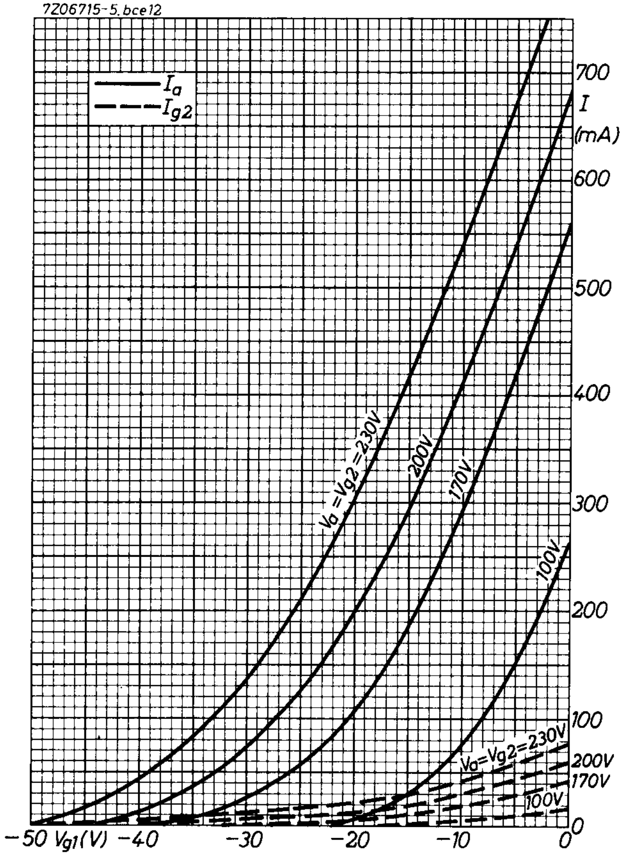
**OPERATING CHARACTERISTICS**

Output tube class B (2 tubes) Excitation to maximum output is continuously permitted.

| | | | | |
|---|---|---|---|---|
| Anode voltage | $V_a$ | 250 | | V |
| Grid No.2 voltage | $V_{g2}$ | 170 | | V |
| Grid No.1 voltage | $-V_{g1}$ | 34 | | V |
| Load resistance | $R_{aa\sim}$ | 3 | | kΩ |
| Grid No.2 resistor | $R_{g2}$ | 2x0.5 | | kΩ [1]) |
| Input voltage | $V_i$ | 0 | 22 | $V_{RMS}$ |
| Anode current | $I_a$ | 2x12 | 2x94 | mA |
| Grid No.2 current | $I_{g2}$ | 2x1 | 2x28 | mA |
| Output power | $W_o$ | 0 | 30 | W |
| Total distortion | $d_{tot}$ | | 6 | % |

[1]) To avoid overloading of grid No.2 this resistor should not be by-passed.




7Z06715-5.bce12
$I_a$
$I_{g2}$
700
I
(mA)
600
500
400
300
200
100
0
$V_a = V_{g2} = 230V$
200V
170V
100V
$V_a = V_{g2} = 230V$
200V
170V
100V
−50 $V_{g1}$(V) −40
−30
−20
−10
0

PHILIPS

Data handbook

Electronic components and materials

**E236L**

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